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ABSTRACT

This report is a description and evaluation of two computer-based learning environments, Rappin' Reader and Say Say Oh Playmate, that build upon the lived literacy experiences African-American children bring to classrooms as scaffolds for early literacy instruction. When Rappin' Reader and Say Say Oh Playmate were used with low-socioeconomic-status African-American first to fourth graders attending after school tutoring/mentoring programs, students made substantial gains on literacy measures such as sight word knowledge. The results suggest at least modest benefits from using culturally responsive reading materials and a computer-based learning environment in literacy instruction. Contains 37 references, 6 tables and 5 figures of data. (Author/RS)

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Learning to Read in Culturally Responsive Computer Environments

Nichole Pinkard
University of Michigan

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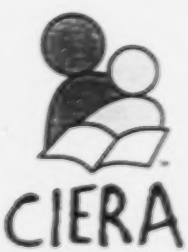
CIERA Inquiry 1: Readers and Texts
Can culturally responsive software programs motivate reluctant beginning readers? Can culturally defined oral language skills possessed by African-American children serve as effective bridges to developing early literacy skills?

This report is a description and evaluation of two computer-based learning environments, Rappin' Reader and Say Say Oh Playmate, that build upon the lived literacy experiences African-American children bring to classrooms as scaffolds for early literacy instruction. When Rappin' Reader and Say Say Oh Playmate were used with low-socioeconomic-status African-American first to fourth graders attending after school tutoring/mentoring programs, students made substantial gains on literacy measures such as sight word knowledge. The results suggest at least modest benefits from using culturally responsive reading materials and a computer-based learning environment in literacy instruction.



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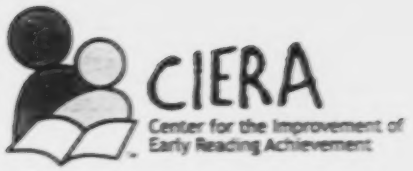

University of Michigan School of Education

610 E University Ave., Rm 1600 SEB
Ann Arbor, MI 48109-1259

734.647.6940 voice
734.763.1229 fax
ciera@umich.edu

www.ciera.org

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Learning to Read in Culturally Responsive Computer Environments

Nichole Pinkard
University of Michigan

Reading researchers have consistently found that African-American and European-American students differ in storytelling style (Michaels 1981), writing style preference (Ball, 1992), oral language skills (Labov, 1972; Smitherman & McGinnis, 1977), and questioning styles (Hale, 1986; Heath, 1983). Although research uncovering these group differences in language skills abounds, the implications of these differences for instruction have not been adequately addressed empirically. There is also little research evaluating the effectiveness of literacy programs developed specifically for African-American students (Lee, 1995a; Thonis, 1989). This lack of research has led to the development and use of instructional strategies and materials designed for mainstream children; materials developed in this manner do not adequately reflect the lived literacy experiences of African-American children. This may result in African-American children feeling disconnected and uninterested in the instructional strategies and materials.

In response to the growing disconnect between minority students and instructional practices, researchers have begun to investigate the relevance and importance of culturally responsive instruction. Proponents of culturally responsive pedagogy (Irvine, 1990; King, 1990; Ladson-Billings, 1992, 1994; Lee, 1992, 1995a, 1995b; Shujaa; 1995) state that learning is most efficient when students are able to draw upon knowledge of concepts, procedures, and strategies they know well. With culturally responsive pedagogy, students are better able to construct mental representations of new concepts, procedures, and strategies. Previous studies have shown that when home language is devalued within the classroom, students' abilities to learn to read and write are negatively affected (Cazden, 1988; Delpit, 1987, 1988; Heath, 1983; Lee, 1995a, 1995b). Results such as these have led some scholars to use a sociocultural lens to examine and rethink *how* students are taught to read and write. Because sociocultural theories view society and culture as mediators through which students make sense of the world (Cole, 1996; Rogoff & Lave, 1984), they are more likely to unearth practices that are sensitive to the cultural needs and aspirations of particular cultural groups.

While research has explored the connection between culturally responsive instruction and reading comprehension, less emphasis has been placed on understanding the impact of culturally responsive instruction on children's

early literacy learning. One facet of language development yet unexplored empirically is the relationship between language rhythm and patterning, and the acquisition of word recognition skills. The most likely mediator of young children's word recognition repertoire is phonemic awareness (see Adams, 1990, for a review), the ability to segment the stream of speech one hears into subword-level component sounds such as syllables, phonemes, onsets (the initial sound cluster, such as /st/ in star), and rimes (common ending patterns, such as /ar/ in star, car, par, far, etc.). When instruction in phonemic awareness is based upon mainstream language patterns, young African-American children may be put at a disadvantage because of linguistic differences in consonant production (e.g., final consonant cluster reduction, such as saying /pas/ when reading "past") and vowel production, not to mention cultural differences in the materials used to promote phonemic awareness. For example, to ensure that children are familiar with rhyming (which is often viewed as a direct link to their understanding of "rime" as the ending part of a monosyllabic word), preschools and kindergarten teachers often engage children in reciting "familiar" nursery rhymes. These "familiar" nursery rhymes may or may not represent culturally responsive pedagogy for young African-American children. Phonemic awareness, both because of its importance to later word and phonics skills and its inherent abstractness, is one area in which African-American children may benefit from culturally responsive pedagogy and materials. Differences in phonemic awareness are rarely, if ever, recognized in school settings. This study, in part, asks the question, What happens if they are recognized and privileged in the curriculum?

Objectives

The goal of this line of work is to explore how culturally defined oral language skills possessed by African-American children can serve as critical bridges to developing early literacy skills. Rappin' Reader and Say Say Oh Playmate, computer-based learning environments designed to facilitate the development of literacy skills in African-American children, will be described and evaluated. This paper will present empirical evidence of the benefits of these programs with a group of struggling readers. While the study is exploratory in nature, analyses of the influence of ethnicity, age, and gender provide insight into the potential of Rappin' Reader and Say Say Oh Playmate. The manner in which these programs attempt to enhance letter-sound relationships will be described, as will the ways in which the software draws on African-American children's cultural experiences to maximize their engagement in reading.

Speech Play as a Source for Engagement and Skills in Reading

Psychologists (Vygotsky, 1962), linguists (Weir, 1962), and psycholinguists (Cazden, 1972) have described the manner in which children engage in language or speech play as part of acquiring their native language. Children manipulate the sounds of language in monologues, as well as in the com-

pany of peers (Hiebert & Cherry, 1978). These manipulations are simultaneously purposeful and playful. Before children are completely facile with the syntactic and semantic forms of language, language play is a means by which children build foundations for later competence in oral language.

Language play also aids the acquisition of written language. Young children "play" with graphemes when they are learning to write (Hiebert & Raphael, 1998). Play with the syntactic, semantic, and pragmatic systems of written language has received less attention but is just as likely to be critical to children's fluency and ease with written language. Only recently, however, has the function of nursery rhymes and predictable written genres in children's literacy development been understood. The study of the function of nursery rhymes and predictable written genres on literacy development (Hiebert & Raphael, 1998) provides some evidence of the importance of language play on written language development.

The integration of the language play of cultural groups other than European-Americans into the school curriculum has been negligible. There have been rich descriptions from the anthropological and linguistic files of the complex and intricate speech play routines of African-American groups (Labov, 1972; Smitherman & McGinnis, 1977). Lee (1995b), for example, describes the sophisticated nature of adolescent African-American students' knowledge of signifying. Yet, despite explicit efforts to identify the culturally responsive strengths of African-American language skills, this knowledge is not used as a resource in classrooms. Indeed, this cultural language play of African-American students is sometimes devalued and disparaged to the point of attributing inferior language skills to African-American students (Michaels, 1981).

Interestingly, and ironically, the language play of African-Americans has been popularized within popular American culture. Rap music, which developed in African-American culture, is a primary example of one language play system which has been valued and imitated within mainstream American culture. Playground chants such as Miss Mary Mack are other examples of language play systems imitated within mainstream culture. Girls throughout America play this and other clapping games. Yet, the value of these oracy skills has not been fully examined as a resource for school learning.

Creating a Culturally and Instructionally Responsive Beginning Reading Experience

Children who are struggling to read often appear disengaged from the learning process. The task of the instructor is to find new ways to engage these students in the process of learning to read. Rappin' Reader and Say Say Oh Playmate are two attempts at engaging students in the process of learning to read. Both systems were designed to develop the language skills children need to become independent readers and writers. Both programs rely heavily on the assumption that if cultural responsiveness is uppermost in the mind of the designer of instructional materials, the outcome will be materials that are so engaging that learning cannot help but occur. In short, a direct link is assumed from cultural responsiveness through engagement to learning.

Rappin' Reader

Rappin' Reader (Pinkard, 1996) is a computer-based learning environment based on the belief that in order for students to use their oracy as a scaffold, they must read contextually familiar text. Rappin' Reader situates the reading task in the familiar world of rap music by having students construct lyrics to familiar rap music. There are five "contexts" within the Rappin' Reader software: (a) the Boss's Office, (b) the Student Office, (c) the Mixing Studio, (d) the Recording Room, and (e) the Premier Room. A variety of tasks that involve reading, writing, and listening occur in these venues. See http://www.umich.edu/~medal/rrshots/index.html for screen images depicting the various modes within these five contexts.

The *Boss's Office* is where students are given their tasks and told to select a rap group for which to work.

In the *Student Office*, the children can ask to see the lyrics of the song. As the words for a familiar rap (Kriss Kross's I Missed the Bus) or a parody of an adult rap song (in a form for children) appear on the computer screen, the child hears the words on a soundtrack. There are two activities with the content of the lyrics—a cloze activity and a scramble sentence activity. Cloze activities have a long history and have demonstrated effectiveness in reading education (Klare, 1984). The task is to find missing words in a rap song from a group of words, some of which are distracters of the target words. To aid students in completing the activity, Rappin' Reader can rap students' sentences back to them. In addition, students can get hints based on proven word recognition strategies.

In the *Mixing Studio*, there are three modes. First, the child is given the task of writing a "concert" version of a rap song that will be performed by real rappers. The second, "Weird Al," involves substituting words for the existing lyrics of the rap song to create a parody of the rap song. In the third mode, the writing and picture creation screens, the child creates an original rap song. Students use a built-in word processor to write their original lyrics. Clip art is used as a tool for generating ideas for the child's original song and as a means of enabling the system to prompt the student with context-rich questions when they are experiencing writer's block. For example, if the child's picture contains a forest, the system asks the child, "In your picture, you have selected a forest as the background. What is going to happen in the forest?"

In the *Recording Room*, the children use a microphone to record the lyrics to his/her song. After recording the song students can play back their version. Students can record their songs over until they are satisfied with the recording. While the system does not verify that students record what they have written, text-to-speech functionality is provided to enable students to hear a computer generated voice read their written lyrics.

In the *Premier Room*, the student's lyrics, recording, and pictures are combined to create a video which is shared with the Boss and a "talent search committee." The Premier Room also provides a context for the children to share their original rap songs with other children. The child will also later share his rap with his classmates in a small or large group context.

Say Say Oh Playmate

Say Say Oh Playmate (Pinkard, 1998b) is also based upon the belief that students can use their oracy as a scaffold when reading contextually familiar text. The familiar text used in Say Say Oh Playmate consists of traditional African-American clap-routine lyrics. There are six contexts within Say Say Oh Playmate: (a) Neighborhood Overview, (b) Leaf Area, (c) Clap Screen, (d) Playground, (e) Writing Area, and (f) Recording Room. See http://www.umich.edu/~medal/ssopmweb/software.html for screen images depicting the various various modes within these five contexts.

In the *Neighborhood Overview*, students are introduced to their helper "Sam" and given their assignment of teaching clap-routines to two young neighborhood girls. Students are also able to decide the activity they want to work on from this screen.

In the *Leaf Area (Reconstruct Lyrics Area)*, students are responsible for reconstructing all of the lyrics to a song, one line at a time. To help the student reconstruct the lyrics, Sam sings the original song, sings the students' version of the song, checks the students' work, and provides context clues based on proven word recognition strategies and the student's prior history of using the system (Pinkard, 1998a).

One of the areas students can visit at the *Clap Screen* is the *Construct a Clap-Routine Area*. Students are responsible for constructing the correct clap-routine sequence. To help the student, Sam claps the correct routine, claps the student's routine, provides hints on individual claps, and checks the student's work. This activity is designed to help students understand symbols and patterns.

Since clap-routines are often regional in nature, we can not expect all students to know the same version of a clap-routine. To help students learn the versions used in Say Say Oh Playmate, students can elect to practice a clap-routine with Sam in the *Practice Clap-Routine Area*. Students can control how quickly or slowly Sam claps. This area is design to reflect as closely as possible the social environment in which children traditionally learn clap-routines, one-on-one.

In the *Playground (Performance Area)*, students are able to see the two animated characters perform the routine. The two girls are only able to perform the parts of the routine that they have been taught. Thus, if a student has only taught the girls how to sing the first line of Miss Mary Mack, that is all the girls will sing. If the girls have been taught how to sing and clap the first stanza of Miss Mary Mack, then the student will be able to hear and see the girls sing and clap the first stanza. The performance area serves as both a motivator and feedback mechanism.

While a major component of Say Say Oh Playmate focuses on assisting students in early literacy skills by reconstructing familiar and predictable texts, an equally important component of the system is the *Writing Area*. In this area, students are given the task of creating an original clap-routine. Students first choose an existing clap-routine as a template to provide both a writing template and a recording rhythm. Students then have the option of writing their song from scratch or changing some of the words in their template

song. To help students in writing their song, a dictionary of 1,400 words, each containing a definition, example sentence, rhyming words, and functionally similar words (i.e. colors, names, types of cars) is provided.

In the *Recording Room*, students record themselves singing their original song. Since the song uses the rhythm template of an existing song, the system is able to highlight the words of the student's song when they should be sung to help the child sing the song correctly. Students are able to record their song until they feel it is correct.

After recording the song, students are taken back to the *Construct a Clap-Routine Area* to create an original clap-routine for their song. Students are able to see their routine performed in the Performance Area by the two girls. Students will see the lyrics to their song, hear their recording, and see the girls clap their routine.

To strengthen the connections between Say Say Oh Playmate and students' real life renditions of clap-routines, students are able to print out their clap-routines to share with friends, publish their clap-routines to a Say Say Oh Playmate website, and download clap-routines created by other students into their Say Say Oh Playmate program.

Cultural Responsiveness

Both programs were designed to appeal to low-socioeconomic-status (SES) African-American primary-grade students. The programs are designed for an audience of readers for whom rap music and clap-routines are a part of everyday lived experience. There are several reasons to assume that these will serve as effective sources of early reading material for young African-American children.

Artifact of African-American culture.

Rap music is predominant in the lives of African-American children, especially boys. Clap-routines are a traditional activity performed by girls, particularly African-American girls. Often clap-routines are passed down from generation to generation. For example, a mother might teach her daughter the routines she knew as a child.

Repetitive lyrics.

Word repetition facilitates acquisition of new words (Smith, 1994). In many traditional stories, words and phrases are not repeated and a student follows the story for long periods before seeing the same word again. Thus, the student is not getting the beneficial effect of having seen a word before. In many rap songs and clap-routines, the essential content words are repeated in a quick succession throughout the song.

Motivational impact.

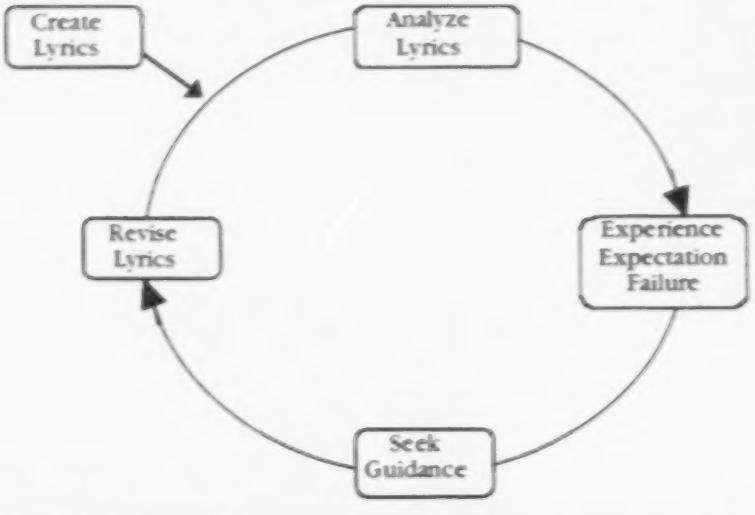
Rappin' Reader may be particularly beneficial for African-American males, who are the least motivated to learn to read. African-American males are the largest contingency of rap music listeners. Their lack of motivation may be due to the fact that traditional reading texts do not reflect their lives. In addition, many of these students may aspire to become rappers or look up to rappers as role models. Girls who admire rappers like Queen Latifah may also benefit from this program. Using rap music as reading material helps

demonstrate the value of reading in the lives of these children, regardless of their aspirations.

Instructional Relevance

Just as important as cultural responsiveness to the success of an intervention is instructional relevance. Since students are reconstructing familiar songs and clap-routine chants, they should be able to use their prior knowledge of the song as a scaffold. For example, in Rappin' Reader, students reconstruct lyrics by dragging missing words into their correct spots (see Figure 1). In both Rappin' Reader and Say Say Oh Playmate, much of the students' learning occurs after they have initially constructed a segment of the song. To check work, both systems play a student's version, then query about whether the student has correctly constructed the song. It is hypothesized that a student who knows a song orally will be able to discriminate between correct and incorrect versions of a written song. When a student hears an error, phonological and contextual knowledge might provide hints as to where the orthographic error exists. If the student hears an error, the system provides guidance about the location of the error and how to correct it. To scaffold the student through this process, built-in word recognition strategies are available. Below is a diagram of the stages of the reconstruction process.

Figure 1: Diagram of reconstructing lyric process.



The student repeats this process many times until the lyrics are successfully reconstructed. If recognized, the students' construction errors are learning opportunities. With each mistake and attempt at constructing the lyrics, the student is building written language skills; focusing on the letters that make up individual words; and strengthening the bond between the meaning and the phonological, contextual, and orthographic representations of words.

Word recognition strategies.

When students are unable to find and/or correct orthographic errors, Rappin' Reader and Say Say Oh Playmate employ specific word recognition strategies to aid the student. Below are descriptions of these word recognition strategies. All of the strategies concentrate on helping students understand the phonemic and orthographic representation of words.

Decoding by analogy. Research has shown that advanced readers make analogies between known and unfamiliar words (Goswami, 1986, 1988). Goswami (1988, 1990) argues that beginning readers are able to use analogies to read words if they are explicitly made aware of this strategy. If students become explicitly aware of the similarity between two words, they use this similarity to learn new words. Both systems provide individualized analogy instruction by keeping a list of the words the student learns while using the system.[1] For example, if a student is experiencing difficulty finding the word "missed" and the student already learned the word "kissed," Rappin' Reader will make the student aware of the fact that "missed" and "kissed" sound very much alike.

Morphemic clues. A morphemic strategy is deployed by Rappin' Reader when students experience problems with compound words whose subwords the program believes are part of the students' sight vocabulary. Teaching the student the word "baseball" by using the fact that the student already knows the word "base" is an example of the morphemic strategy. Once Rappin' Reader has made the student aware of the known part of the word, it focuses on the word part the student does not know by using another word recognition strategy.

Onset and rime. Goswami's onset and rime strategy (1990) is a useful word recognition strategy when neither the analogy nor morphemic strategy is appropriate. The onset and rime strategy groups phonemes into easy-to-learn rimes. For example, the onset and rime strategy divides the word *cat* into /c/ and /at/, *string* into /str/ and /ing/, and *light* into /l/ and /ight/.

Sequential decoding. Sequential decoding—producing the sound of each letter and blending them together—is utilized only if the other word recognition strategies are not applicable.

Table 1: Example of word recognition strategies applied to a given word.

Word	Analogy	Morphemic	Onset & Rime	Phonics
missed	kissed	miss, ed	m, issed	m, i, ss, ed

Example of word recognition strategies.

Table 1 is an example of the order in which cues are presented to a student using either Rappin' Reader or Say Say Oh Playmate. Each of the above word recognition strategies is applied to the same word. This ability to present one word via multiple strategies provides the opportunity to individualize word recognition help for each child.

Formative Evaluations of Rappin' Reader and Say Say Oh Playmate

Above, the theoretical rationale, examples, and pedagogical underpinnings of both Rappin' Reader and Say Say Oh Playmate have been presented. In this section, attention is focused on formative evaluations of both systems.

Research Questions

The studies presented below explore whether either system can serve as an effective mechanism for helping students use their oral knowledge of lyrics as a scaffold in acquiring the orthographic representation of the lyrics. In particular, these studies investigated the implications of using rap lyrics and clap-routine lyrics as sources of reading material for beginning literacy instruction, and relate to the larger question of the efficacy of culturally sensitive instruction. These studies hope to provide insight into the following questions:

- Do Rappin' Reader or Say Say Oh Playmate improve students' sight vocabulary?
- Does ethnicity affect students' performance with Rappin' Reader?
- Does ethnicity affect students' song preference?
- Can Rappin' Reader or Say Say Oh Playmate motivate students who dislike reading to perform activities that rely heavily on reading skills?

Study of Rappin' Reader

Site selection.

Three locations were chosen as evaluation sites: two after-school centers for low SES African-American students and one computer lab housed in a private university's graduate housing dormitory for MBA students. The two after-school centers were chosen to explore the impact of using after-school centers as vehicles for academic enrichment. Additional benefits included the familiarity and comfort of these centers to the participants, the opportunity to work with students outside of classroom time confinements; and the availability of alternative student activities (e.g., basketball, computers, arts & crafts, talking) which provide natural measures against which to gauge students' desire to use the Rappin' Reader program. The computer-lab location was selected because of the large concentration of European-American middle-class students, a number of whom attended the same schools as African-American students from another study site, had access to the computer lab, and had parents who were willing to allow students to participate in the study.

Site A: Downtown Housing Project. The first after-school tutoring center, Downtown Housing Project,[2] is located in a large midwestern housing

project and provides one-on-one tutoring for first- through sixth-grade low-income African-American children. Students and tutors work together one night a week throughout the school year.

The director supplied the research team with a list of 29 male students. Students were included on the list that (a) participated in the center's remedial reading program, (b) were in the first or second grade, and (c) had an excellent attendance record. All students and mentors on the list were asked to participate in the study. Twelve mentors declined and six students were unable to provide permission slips signed by a parent or guardian. One student was not included in the study because the research team wanted equal numbers of first- and second-grade children. The study began with five first-grade and five second-grade children.

Site B: Suburban Community Center. The second location (Site B) is an after-school program for third- to eighth-grade African American low-income students born to unwed teenage mothers. Suburban Community Center, located near a large midwestern town, proactively intervenes in the lives of students who, according to statistics, are most likely to become teenage parents and/or leave school before graduating. Eighty-two percent of male students and 65% of female students involved in the after-school program are participants in their school district's remedial reading program. Similar to the Downtown Housing Project, this tutoring center contains a library and a computer lab.

Site C: University Housing. Unlike the first two sites, University Housing is not an after-school tutoring program but a computer lab housed in a graduate housing dormitory for MBA students at a private university. The dormitory is located in a suburb of a large midwestern town. A flier was handed out to MBA students living in the dormitory, asking for their children to participate in the study. Seven families with children ranging from first to fourth grade agreed to participate in the study. Seven boys and three girls participated. Table 2 provides a summary of the participants' age and race.

Table 2: Rappin'Reader study participant demographics.

Location	Grade in School				Race		Gender	
	1st	2nd	3rd	4th	Black	White	Female	Male
Site A	5	5	0	0	10	0	0	10
Site B	0	0	10	3	11	2	0	13
Site C	4	3	2	1	2	8	3	7
Totals	9	8	12	4	23	10	3	30

Materials.

The reading material used in this study consisted of the Rappin' Reader application and the following rap songs

I Missed the Bus—Kriss Kross

What a Mouse—Mickey and Minnie Mouse

Whoomp There it Went—Mickey Mouse and Goofy

These songs were chosen because (a) a large number of words in each song appeared on Dolch's second-grade vocabulary word list; (b) each song was a

popular rap song or a parody of a popular song; (c) both Kriss Kross and Mickey Mouse are recognizable artists; and (d) the content of the songs was deemed appropriate for children.

The following instruments were developed to gather data: preinterview, pretest, postinterview, and posttest. The pre- and postinterview were designed to ascertain students' perceptions of the function of reading, their familiarity with computer software, and the motivational effects of Rappin' Reader. Each student was asked to rank the songs used in Rappin' Reader by preference. The first choice was used as the test song. A pretest was then administered to ascertain how many words in the test song were part of the students' sight vocabulary. To control for the influence of contextual knowledge on their ability to read the words, the words in the test song were randomized and presented to the student individually for three seconds. After this time, the student was asked to read the word.

Each student used Rappin' Reader for one 90-minute session. The first 20 minutes were spent teaching the student how to use the system with the lowest-ranked song. The student spent the remaining 70 minutes using the system with the highest-ranked song.

A posttest was administered 48 hours later, measuring (a) how many words in the test song were part of the students' sight vocabulary, and (b) how much of the test song the student knew how to sing.

Results.

Sight vocabulary. As Table 3 illustrates, there was a consistent gain in sight words between the pre- and posttests. The average gain among all students was 7.3 new words. The second-grade students had the biggest gain of 7.95 new words. All students learned new words between the pre- and posttests.

Table 3: Rappin'Reader study participants' sight word gains

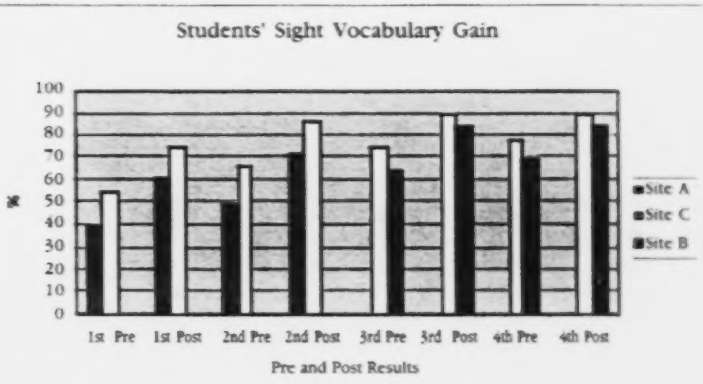
	Site A			Site B			Site C			Average
	Pre	Post	Gain	Pre	Post	Gain	Pre	Post	Gain	Gain
First Grade	15.20	23.2	7.9	—	—	—	20.9	28.7	7.8	7.8
Second Grade	19.00	27.4	8.4	—	—	—	25.5	32.7	7.2	7.95
Third Grade	—	—	—	24.3	31.7	7.4	28.5	33.8	5.3	7.05
Fourth Grade	—	—	—	26.2	32.2	6.0	29.6	34.1	4.5	5.62

Group differences between African-American and European-American students were found. While European-American students had a higher pretest and posttest average number of words learned in all grade levels, African-American students had a greater percentage gain in sight vocabulary than European-American students. For example, third-grade African-American students averaged a 19% increase, compared to a 13% increase by European-American children.

Figure 2 provides more insight into students' gain in sight vocabulary by depicting percentage gain in words learned. The younger the student, the greater the percentage gain (i.e., 1st graders 20.5%; 4th graders 14.7%).

Song preference. An underlying hypothesis of this research is that students' choice of reading material is culturally defined. Thus, as students vary according to ethnicity, age, and gender, one might expect their choice of

Figure 2: Grade level sight vocabulary average gain in Rappin' Reader study.



reading material to vary. Data was collected on students' song preference. Table 4 depicts these results. All the rap songs in this study were written for a child audience; I Missed the Bus by Kriss Kross, however, will be considered more "traditional" because of the popularity and longevity of the rap group. The rap songs by Mickey and Minnie Mouse, Whoomp There it Went and What a Mouse, will not be classified as traditional rap songs because of the parody nature of the songs and the use of the Mickey Mouse group as rappers.

Table 4: Rappin' Reader study participants' song preferences.

Song	Total Students	Grade in School				Race		Gender	
		1st	2nd	3rd	4th	Black	White	Female	Male
What a Mouse	11	7	2	2	0	4	7	3	8
I Missed the Bus	13	0	3	7	3	13	0	0	13
Whoomp There It Went	9	2	3	3	1	6	3	0	9
Totals	33	9	8	12	4	23	10	3	30

Students song preference did vary along cultural lines. African-American students preferred the more traditional rap song, while European-American students preferred Mickey Mouse's versions of two popular rap songs. Song preferences also varied according to age. All first-grade students (100%) preferred the Mickey Mouse rap songs, while the majority (67%) of third- and fourth-grade students preferred I Missed the Bus. The girls in the study all preferred Minnie Mouse's song What a Mouse.

Motivation. A question asked at the beginning of this article was whether Rappin' Reader could improve students' motivation to read. To begin to answer this question, we measured students' enjoyment of reading and software preference. A question in the postinterview asked students to rate a list of software titles, including Rappin' Reader and other educational software titles accessible to the students. Most students rated Rappin' Reader as their

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favorite software application. As Table 5 shows, Rappin' Reader received 14 first place votes. Kid Pix, the next highest rated program, received 4 votes.

Table 5: Rappin' Reader study participants' software preferences

Title	Votes	% Votes
Reader Rabbit	0	0%
Math Blaster	3	13%
Amazing Writing Machine	0	0%
Rappin' Reader	14	60.8%
Kid Pix	4	17.4%
Carmen Sandiago	1	4.4%
Just Grandma and Me	1	4.4%

During the pretest, the students were asked whether they enjoyed reading. Interestingly, 84% (11 of 13) of those who indicated that they did not like to read rated Rappin' Reader as their favorite program. In addition, in the postinterview, these students again stated that they liked Rappin' Reader and would use it again.

Discussion

Does Rappin' Reader improve students' sight vocabulary?

As Table 3 illustrates, in all instances students improved their sight vocabulary by using Rappin' Reader. Across all age groups, the average word increase was 7.5 words, or 20.6%. This increase is based on students using Rappin' Reader for one 70-minute session. I argue that these results can be attributed to the design of Rappin' Reader. By combining reading material drawn from oral language with activities that require students to reconstruct lyrics, Rappin' Reader moves beyond traditional reading approaches that just ask students to read contextually familiar or predictable texts. Rappin' Reader forces students to construct the text by relying on their oral knowledge of the song, their developing orthographic knowledge, and feedback from the system.

A closer look at the data reveals that first and second graders had a greater average gain than third and fourth graders. First graders averaged a 20.8% (7.84 words) gain compared to fourth graders gain of 14.7% (5.62 words). A ceiling effect might explain the difference. The third and fourth graders' knew an average of 26.41 and 27.9 (out of 38) words respectively before using Rappin' Reader, while the first and second graders knew only 18.05 and 22.3 words, respectively. Thus, the margin for improvement for third and fourth graders was narrower.

Does ethnicity effect students' performance with Rappin' Reader?

Rappin' Reader was specifically designed to build upon the prior knowledge and interest of African-American children. Therefore, African-American children were expected to benefit more from Rappin' Reader than European-American children. African-American students at each grade level improved at an equal or greater rate than their European-American counterparts. For example, second-grade African-American students improved their sight

vocabulary by 8.4 words, compared to an improvement of 7.2 words among European-American students. These results are provocative because they suggest that ethnicity-based differences in performance on national tests, such as the NAEP (Campbell et al, 1994) and the National Educational Goals Report, may be due to the selection of reading material.

Does ethnicity effect students' song preference?

Analyzing the data reveals that the song I Missed the Bus by Kriss Kross was the most popular song. However, a closer look reveals that I Missed the Bus was not the most popular song for all age and ethnic groups. I Missed the Bus was extremely popular among African-American third- and fourth-grade students. Neither European-American nor African-American first-grade students rated I Missed the Bus highly. In fact, it did not receive any votes from European-American children. These results can possibly be explained by the age of the song. I Missed the Bus was a popular rap song recorded in 1992, thus younger students are unlikely to have heard it. Regardless of age, European-American students involved in our study are unlikely to have heard I Missed the Bus because all of their parents reported that they do not listen to rap music in their homes.

The European-American students involved in the study clearly preferred the rap song What a Mouse (70%). An explanation for this preference might be the students' familiarity with Minnie Mouse and the song's reference to Mickey Mouse. Thus, the song is more familiar to the students than I Missed the Bus.

The three girls involved in the study preferred What a Mouse, performed by Minnie Mouse, raising the issue of the role of gender-specific learning materials—whether girls prefer songs that deal with "girl" issues. Unfortunately, the number of girls participating in the study was so small that it is impossible to attempt to answer this question.

Replication of these results with a larger sample size will be needed to provide conclusive evidence of the importance of allowing students to pick their choice of reading material and providing culturally responsive reading among their choices.

Can Rappin' Reader motivate students who dislike reading to perform activities that rely heavily on reading skills?

The creation of Rappin' Reader was motivated by the researcher's desire to create a reading environment that draws on students' interest in rap music and rap artists. Thus, it was important to ascertain whether the Rappin' Reader system was successful in building upon student interest. As Table 5 illustrates, students ranked Rappin' Reader as the most popular software title. One plausible explanation for this ranking is the Hawthorne effect. Since the students had just used Rappin' Reader, they might have been more disposed to rank it higher. However, the sheer disparity between the rankings of Rappin' Reader and other software applications suggests that it was the program, not its novelty, that accounts for the positive motivational effects of Rappin' Reader.

In addition to ranking Rappin' Reader as the most popular software title, students overwhelmingly commented in their postinterviews that they would recommend the purchase of Rappin' Reader by their parents or after-school program. A fourth-grade student stated:

> "Rappin' Reader should be used in schools because it is a fun way to learn to read."

Eleven of the thirteen students (84%) who answered "no" to the preinterview question of "Do you like to read?" stated in the postinterview they liked Rappin' Reader and would use it again. In addition, these students' experienced the same word gain as students who answered "yes" to the preinterview question (7.3). These findings suggest that students who do not like to read may enjoy reading after using technology-based methods for improving their reading abilities. Other researchers (Holum, 1997) have similarly reported the positive effect of using technology to increase interest in learning to read.

Formative Evaluation of Say Say Oh Playmate

Research questions.

The specific research questions addressed in this study are:

- Do children improve their sight vocabulary by using Say Say Oh Playmate?
- Does the use of a culturally responsive interface affect children's motivation to use Say Say Oh Playmate?
- Do children use their prior knowledge of clap lyrics as a scaffold?
- Can Say Say Oh Playmate motivate children who dislike reading to perform activities that rely heavily on reading skills?

Subjects.

Selection of site. The site for this research is an after-school mentoring/tutoring program for low-income African-American students living in a large housing project located in a large midwestern city. Mentors and tutors meet at least once a week for 90 minutes. Some mentors spend time with students over the weekend. Students and mentors continue to work together from year to year as long as both are involved in the program.

Selection of students. Fliers asking for participants were prepared and given to female first- and second-grade students and their mentors. Twelve students, seven in first grade and five in second grade, were selected for participation according to their knowledge of clapping songs, age, program attendance record, and signed permission slip.

Materials and procedures used in the study.

The materials used in this study consisted of the Say Say Oh Playmate application with the following clapping songs: Miss Mary Mack, Miss Lucy, Say Say Oh Playmate, Down Down Baby. The twelve participants were paired into six groups. Students worked in groups of two using Say Say Oh Playmate. The study consisted of pairs of students using Say Say Oh Playmate for two 90-minute sessions. Students spent an additional 30 minutes learning to use the system during their first session. After the children became comfortable with the system, they used the program with one familiar song and one unfamiliar song.

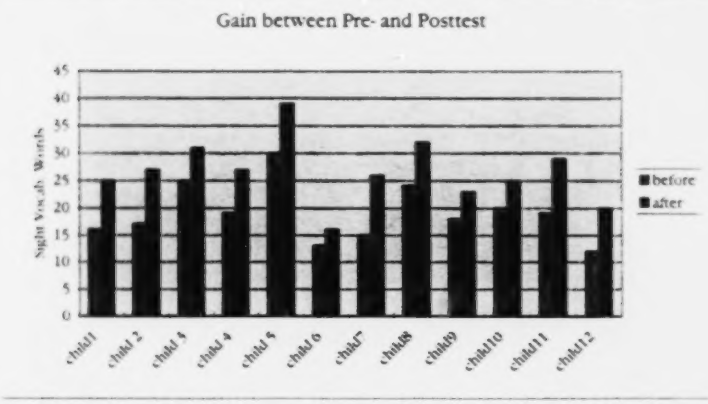
Preinterview, pretest, postinterview, and posttest instruments were developed to address the research questions. Pre- and postinterviews were conducted to gather data pertaining to student's enjoyment of reading, amount of reading, past use of educational software, and perceptions of Say Say Oh Playmate software. Pre- and posttest were administered to ascertain how

many words in the test song were part of the students' sight vocabulary. To control for the influence of contextual knowledge on their ability to read the words, the words in the test song were randomized and presented to the student individually for three seconds. After this time, the student was asked to read the word.

Results.

Improving students' beginning reading skills. To determine whether Say Say Oh Playmate was successful in achieving the goal of improving reading skills, word gain was assessed by comparing reading ability during the pre- and posttest. Figure 3 depicts students performance on both tests.

Figure 3: Participants' sight vocabulary gain in Say Say Oh Playmate study.



As Figure 3 illustrates, all students showed performance gains from pre- to posttest. Mean performance on the pretest was 17 out of 41 words, for an average of 41% word gain. After 90 minutes of using the system, mean performance on the posttest was 26.7 words (65%), a word gain of 9.7 words, or 24%.

As with Rappin' Reader, it is possible that the students could have learned just as many or more words in the same time by reading the lyrics with a tutor. We did attempt to implement a control group procedure in which tutors attempted to teach the words in these songs. However, we were unable to maintain student interest long enough to gather reliable control group data using tutors as instructors. Our failure to implement a control group procedure using traditional instructional approaches is telling on the motivation questions. Say Say Oh Playmate was designed for students who are not traditionally motivated to read, so it is not surprising that we were unable to engage students in a traditional tutoring session without the aid of a computer-based learning system.

Figure 4 depicts a histogram that shows a distribution in students' gain in sight vocabulary. All students learned to read some words by using Say Say

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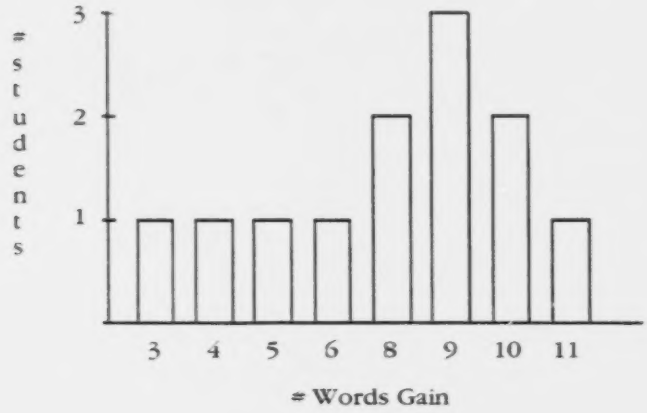
Oh Playmate. The majority of students are clustered around the 8-10 words gained range.

Figure 4: Histogram of students' gain in sight vocabulary words.



Students using Say Say Oh Playmate learned on average 2.4 more words than students using Rappin' Reader. One plausible explanation for this difference is that students have to reconstruct all the lyrics in Say Say Oh Playmate as opposed to focusing on a segment of the lyrics, as in the Rappin' Reader program. Of course, gender differences in the two populations cannot be ruled out as a plausible explanation, especially in view of the long history of gender superiority for girls on literacy and language tasks (Campbell, 1994).

Motivational effects. The motivational effects of Say Say Oh Playmate were also evaluated in the study. To answer this question we relied on data gathered from the pre- and postinterviews. A question in the postinterview asked students to rank their top three software titles from a list of educational software applications that are available in the after-school tutoring program's computer lab. However, we do not have any data on whether the students had previously used each title. Table 6 depicts the results. Votes were awarded points in the inverse order of ranking: 1st place = 3 points, 2nd place = 2 points, and 3rd place = 1 point.

Table 6: Say Say Oh Playtmate study participants' software preferences

Title	Votes	% Votes
Reader Rabbit	1	1.5%
Math Blaster	14	20%
Amazing Writing Machine	1	1.5%
Say Say Oh Playmate	36	51.4%
Kid Pix	4	5.7%
Carmen Sandiago	9	12.9%
Just Grandma and Me	5	7.1%

As the table dictates, Say Say Oh Playmate was clearly the students' favorite software title. It received all 12 first-place votes. Again, as with Rappin' Reader, the Hawthorne effect might account for the great disparity between Say Say Oh Playmate and other software titles.

Case study of two participants.

Because averages tend to obscure the particulars of implementation, I decided to let two students "speak for themselves" about their involvement with Say Say Oh Playmate. The two students we will follow are "Vernae" and "Shonda" because of the extensive knowledge we have about their learning environments and academic achievement.

Vernae was a first-grade student when she participated in the study. She was a reluctant reader who preferred to spend designated reading time on other activities. Academically, Vernae performs well in school. Her last report card consisted of all A's and one B. She received the B in reading comprehension. Vernae is required to read one book a week and to write in a journal that consists of either a book report or a creative extension to the story.

Shonda was also in the first grade when she participated in the study. Shonda is not a very good reader, as illustrated by her grades in school. She received C's in reading and reading comprehension on her report card at the time of the study. Shonda shies away from reading in the presence of other kids, probably due to her difficulty in decoding words. When other kids are not around, Shonda tries very hard to read books.

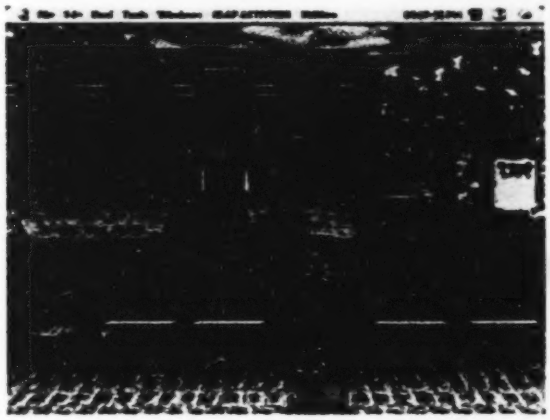
Use of prior knowledge. One of the assumptions of culturally responsive pedagogy is that students will use prior knowledge to scaffold current learning challenges. For Say Say Oh Playmate, this means that they will use their knowledge of how a song sounds to reconstruct the lyrics to the song, and in the process, improve their sight vocabulary. In transcripts of students using Say Say Oh Playmate, this scaffolding process is at work.

When Vernae and Shonda are trying to construct the phrase "Miss Mary Mack Mack Mack all dressed in black black black" they sing the phrase out loud 23 times. Vernae sings the lyrics 14 times and Shonda 9 times. During 10 of the times Vernae sings the phrase she is trying to determine the word that belongs in a specific square. For example, in the transcript below, both girls alternate singing the lyrics:

Both:	"Miss Mary Mack Mack Mack all dressed in"
Shonda:	black
Vernae:	I know, I know
Shonda:	Girl that's not black
Vernae:	I can't find black
Shonda:	There's black. Right here (pointing to a leaf containing the word black
Shonda:	No! No! Miss Mary Mack Mack Mack all dressed in black—Let it go put it right there (pointing to a square) (Vernae drops the word "black" into one of the squares)
Vernae:	Miss Mary (pointing to squares as she sings and stopping at the first empty spot)
Vernae:	You get Mary
Shonda:	Where's Mary
Vernae:	Right there (pointing at a word she thinks is Mary)

To figure out the square's word she points at a new square as she sings each word. After she "finds" the word orally, she searches the words on the leaves until she finds a word for which she thinks she is searching. Of course, there are times that Vernae and Shonda pick the wrong word. When they hear their lyrics played back on every occasion (3) they recognize that the phrase is constructed incorrectly. For example, when the students had constructed "Miss Mary Mack Mack Mack Mack all dressed dressed", clicked the microphone button, and listened to Sam sing back their lyrics, Shonda said "oh-oh" after Sam sang the fourth "Mack". Clearly, in the reconstruction activity, students make use of their prior knowledge of how the song sounds.

Figure 5: Say Say Oh Playmate opening screen. Users are introduced to the program and to Sam, their guide.



Culturally responsive interfaces. One question this study was designed to address is "Does the use of a culturally responsive interface affect children's motivation to use Say Say Oh Playmate. One objective of developing culturally responsive learning environments is to increase motivation to learn in a targeted audience. The case study evidence bolsters the claim that Say Say Oh Playmate is a culturally relevant program for these African-American girls. Below is a transcript of Vernae and Shonda's reaction to the graphical interface upon their first time seeing Say Say Oh Playmate.

System: Opening Screen (see Figure 5)

(A problem initially occurs because there is no sound coming from the computer. Nichole tries to fix the problem. Vernae and Shonda are looking at the computer screen.)

Vernae: Who's is this? (pointing to Sam)
Shonda: Me
Vernae: Who's that girl?
Shonda: Who is that girl? Wait. Who is this girl right here?
Vernae: So, who is she? Who is her?...Who is her?...Who is her?
Shonda: I don't know?
Vernae: Who is her? (she looks at Nichole)
Abby[3]: hold on

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Vernae:	Who is her?
Abby:	Who is she?
Vernae:	Who is she, whatever? Who is she?
Nichole:	Does she look/Who do you think she is?
Vernae:	I don't know
Nichole:	Have you ever seen her before?
Vernae:	No
Shonda:	That's Vernae ain't it?
Nichole:	Does she look like Vernae?
Shonda:	Yes
Vernae:	No
Nichole:	Does she look like you? (looking at Shonda)
Shonda:	Don't play
Vernae:	Who is it?
Nichole:	She's made up
Vernae:	She's pretty so it's going to be me. (She points to herself and she has a big smile on her face.)

Later, while reconstructing the lyrics to the song Miss Mary Mack, Vernae says, "I want to go in. I want to go inside. Let's see what's inside of there" (pointing to the door on figure 5). Her comments are ignored and the girls continue to construct the lyrics. However, when they finish constructing the first phrase, the following interaction takes place.

Shonda:	Don't play
Vernae:	We done, we done, now we can go inside
Nichole:	What do you think is inside
Vernae:	Everything
Nichole:	What's everything
Shonda:	Her table, her clothes, her dress, everything
Nichole:	What you gonna do inside
Vernae:	Eat (laughter). I did all of this work now it is time for you to feed me; then do my homework
Abby:	You want to do your homework?
Vernae:	Yea, what you think she has her bookbag for?

This transcript excerpt sheds some light on how environments can motivate students to perform tasks that they might otherwise be reluctant to perform. In this example, Vernae states that she would do her homework because the help character has her bookbag. Vernae is not a child who will voluntarily do homework. In tutoring sessions, Vernae is reluctant to do her homework; instead, she prefers to draw or play games. Thus, when Vernae willingly states that she will do her homework, it is indicative of the motivational aspects of the program.

These transcripts provide additional evidence of the importance of using culturally responsive learning environments. Both girls interacted with the system (and with each other) with enthusiasm. Their enthusiasm may be due to the cultural relevance of the program to their everyday lives. When Vernae was asked, "What does the first screen in Say Say Oh Playmate remind you of?" she quickly answered by stating the name of the housing project in which she lived.

Conclusion

This article established a rationale for the need to use students' existing oral language as a building block for beginning literacy instruction. Rappin' Reader and Say Say Oh Playmate draw on existing knowledge about how children become literate, and provide a culturally relevant context to facilitate learning. Through the implementation of these programs, several teaching objectives were implemented:

- Enhancing phonemic awareness by representing words syllabically. For example, one rap uses the following line: "He is a mighty good mouse, yes, he is." To aid in phonemic awareness, each syllable of the word would be sounded out and highlighted. The word "mighty" appears as syllables: migh.ty.

- Teaching new words through repetition. The songs were chosen because of their age- and school-appropriateness, but also because of the presence of a significant core of high-frequency words from the Dolch list. The repetitive character of the genres, especially the clap songs, maximized the likelihood that these common words would be exposed frequently for student examination and practice.

- Using phonics and morphology to aid in pronunciation. At various points in the software, phonics and morphology strategies are modeled for the student. When the child is unable to find a word and asks for a phonemic clue, the system chooses the best strategy to aid the child in decoding the unknown word.

- Using familiar context to facilitate learning. Because the reading tasks are situated around the reading of text drawn from students oral language, students are given the opportunity to use their knowledge of the song lyrics to aid in reading the text.

The results provide some evidence for the effectiveness of computer-based instructional programs that build on the cultural knowledge students bring to the classroom. The results from this study showed that students did improve their sight vocabulary substantially on a delayed posttest. In addition, at least for Rappin' Reader, African-American students performed as well as or better than their European-American counterparts.

It is possible that these results could be achieved by other reading methods. This study did not compare either program to other methodologies. However, it is important to restate that these programs, especially Rappin' Reader, are designed for students who are not traditionally motivated to read and who are not successful in the traditional reading programs used in classrooms everyday. Both programs attempt to engage these students in the act of reading in hopes that they discover that reading can be personally meaningful and rewarding.

The work described above provides some promise about the possibilities of creating instructional approaches to improve the early literacy skills of low SES African-American children. While these results are promising, they are not conclusive tests of the instructional efficacy of either Rappin' Reader or Say Say Oh Playmate. A more in-depth evaluation of both programs with a

larger sample size is necessary to answer this question. To this end, Rappin' Reader and Say Say Oh Playmate are being implemented and evaluated in two urban schools (second and fourth grade) which serve a 99% African-American student body.

In the interim, while we wait for a more rigorous test of these materials, there is certainly enough evidence, even in this formative evaluation, to encourage teachers and schools who want to engage struggling African-American students, especially African-American males, with reading materials that can enhance their skill development, to use and evaluate the contribution of these materials as a part of a broader, more complete program of curriculum for urban children.

Notes

1. If a student correctly places a word without making a mistake or needing clues, that word is considered learned.
2. Pseudonyms have been given to all of the contexts in the study.
3. Abby is a research assistant.

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About CIERA

The Center for the Improvement of Early Reading Achievement (CIERA) is the national center for research on early reading and represents a consortium of educators in five universities (University of Michigan, University of Virginia, and Michigan State University with University of Southern California and University of Minnesota), teacher educators, teachers, publishers of texts, tests, and technology, professional organizations, and schools and school districts across the United States. CIERA is supported under the Educational Research and Development Centers Program, PR/Award Number R305R70004, as administered by the Office of Educational Research and Improvement, U.S. Department of Education.

Mission. CIERA's mission is to improve the reading achievement of America's children by generating and disseminating theoretical, empirical, and practical solutions to persistent problems in the learning and teaching of beginning reading.

CIERA Research Model

The model that underlies CIERA's efforts acknowledges many influences on children's reading acquisition. The multiple influences on children's early reading acquisition can be represented in three successive layers, each yielding an area of inquiry of the CIERA scope of work. These three areas of inquiry each present a set of persistent problems in the learning and teaching of beginning reading:

CIERA INQUIRY 1
Readers and Texts

Characteristics of readers and texts and their relationship to early reading achievement. What are the characteristics of readers and texts that have the greatest influence on early success in reading? How can children's existing knowledge and classroom environments enhance the factors that make for success?

CIERA INQUIRY 2
Home and School

Home and school effects on early reading achievment. How do the contexts of homes, communities, classrooms, and schools support high levels of reading achievement among primary-level children? How can these contexts be enhanced to ensure high levels of reading achievement for all children?

CIERA INQUIRY 3
Policy and Profession

Policy and professional effects on early reading achievement. How can new teachers be initiated into the profession and experienced teachers be provided with the knowledge and dispositions to teach young children to read well? How do policies at all levels support or detract from providing all children with access to high levels of reading instruction?

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CIERA
Center for the Improvement of Early Reading Achievement

CIERA is a collaboration of
University of Michigan
University of Virginia
Michigan State University
with
University of Minnesota
University of Southern California

University of Michigan School of Education
610 E University Av, Rm 1600 SEB
Ann Arbor, MI 48109-1259
734.647.6940 voice
734.763.1229 fax
ciera@umich.edu

www.ciera.org

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